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**Two New Species of the Genus *Lucasioides* (Crustacea, Isopoda)
from Mole's Tunnels of Nanto-shi, Toyama, Middle Japan***

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富山県南砺市のモグラの巣穴から発見された陸産等脚目甲殻類の2新種

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京都大学名誉教授相良直彦博士が富山大学の横畑泰志博士やその学生たちとともに富山県南砺市才川七ならびに南砺市安居で行ったモグラの穴から採集された陸産等脚類が2種採集されたが、両種とも *Lucasioides* 属の新種であった。1種目は *Lucasioides toyamaensis* (和名:トヤマハヤシワラジムシ、新称) として記載した。関東地方から知られている *Lucasioides kobarii* (Nunomura) と類似するが、(1)オス第1腹肢外肢の先端がぎざぎざになっていること、(2)尾節板先端がとがっていること、(3)第3胸節の剛毛が比較的側縁に近いこと、(4)第1小顎外肢先端の剛毛がすべて単純なこと、(5)目が小さいことなどにより区別される。

2種目を *Lucasioides sagarai* (和名:モグラアナワラジムシ、新称) として記載した。和歌山から知られている *Lucasioides minatoi* (Nunomura) と類似するが、(1)オス第1腹肢外肢の先端がぎざぎざになっていること、(2)目が小さいこと、(3)第2胸節の剛毛が側縁から遠いこと、(4)オス第1腹肢内肢の先端が外に向かって曲がっている、(5)オス第2腹肢内肢が外肢よりも明らかに長いこと、(6)第7胸肢座節が長いことなどにより区別される。

両種のホロタイプは 富山市科学博物館におかれ、パラタイプは京都大学総合博物館、富山市科学博物館ならびに国立科学博物館におかれる。

キーワード：等脚類、ワラジムシ、モグラの巣、新種、分類学

Key words : Isopod, tunnel of moles, new species, taxonomy

During an ecological research, Dr. Nobohiko Sagara, professor emeritus at Kyoto University, found some strange terrestrial isopod crustaceans from tunnels of moles at Saikawashi and Ango-ji, Nanto-shi, Toyama Ken, central Japan. The specimens were sent to me through the courtesy of Dr. Yasushi Yokohata, Toyama University. As the results of my study, they include two different new species of the genus *Lucasioides*.

Family Agnaridae
***Lucasioides toyamaensis* n.sp.**
(Japanese name: Toyama-hayashi-warajimushi, new)

*Contributions from the Toyama Science Museum, No.343

(Figs. 1 and 2)

Material examined: 5♂♂ (1♂ holotype, 6.6 mm in body length and 4♂♂ paratypes, 6.0~7.2mm in body length) and 9♀♀ (1♀ allotype, 7.9 mm in body length and 8♀♀ paratypes, 5.4~7.4mm in body length), from the tunnel of lesser Japanese mole, *Mogera imaizumii* Saikawa-shichi, Nanto-shi, Toyama-ken, Nov. 5, 2006, coll. Naohiko Sagara. Type series is deposited as follows: holotype (TOYA Cr-13622) allotype (TOYA Cr-13623) and 4 paratypes (TOYA Cr-13624~13927) at Toyama Science Museum, 4 paratypes (KUZ Z11~Z14) at The Kyoto University Museum, and 4 paratypes (NSMT Cr-17977) at National Museum of Nature and Science, Tokyo.

Description: Body 2.0 times as long as wide; color pale brown, with irregular paler patterns. Body with many small granules. Anterolateral lappets developed roundly. Cephalon (Fig.1B) with a low medial lobe. Eyes small and each eye composed of 16-20 ommatidia. Noduli lateralis (Fig.1N) on pereonal somites 2 and 4 remote from lateral margin. Pleotelson strongly protruded backwards.

Antennule (Fig. 1A): segment 1 rectangular; segment 2 short; terminal segment with 7 aesthetascs at the tip. Antenna (Fig.1B): flagellum 2-segmented and distal segment 2.2 times longer than the basal one. Right mandible (Fig.1E): pars incisiva 3-toothed; lacinia mobilis 3-toothed; 3 pencils; processus molaris represented by a tuft of setae. Left mandible (Fig.1F): pars incisiva 3-toothed; lacinia mobilis 3-toothed; 3 pencils; processus molaris represented by a tuft of setae. Maxillula (Fig.1G): outer lobe with 10 simple setae on distal margin. Maxilla (Fig.1 H) relatively narrow. Maxilliped (Fig.1I): endite with 3 spurs and a seta; palp relatively short, with a tuft of setae at the tip.

Pereopod 1 (Fig.2A): basis 3.2 times as long as wide; ischium half the length of basis, with many setae on inner margin; merus 0.8 times as long as ischium, with many long setae on inner margin and a seta at outer distal angle; carpus a little longer than merus, with many long setae including several bifid ones on inner margin; propodus as long as carpus, with 5-6 setae on distal half of inner margin.

Pereopod 2 (Fig.2B) a little longer than the pereopod 1: basis 3.3 times as long as wide ; ischium half the length of basis, with several relatively short setae on inner margin; merus 0.8 times as long as ischium, with many long setae on inner margin and 2-3 setae at outer distal angle; carpus 1.1 times longer than merus, with many setae on inner margin; propodus as long as merus, with 13~14 setae on inner margin.

Pereopod 3 (Fig.2C): basis 2.9 times as long as wide; ischium 55% as long as basis, with 10 setae on inner margin; merus 0.7 times as long as ischium, with many setae on inner margin; carpus 1.4 times longer than merus, with many setae on inner margin; propodus 0.85 times as long as carpus, with 9 setae on inner margin and 11-12 short setae on outer margin.

Pereopod 4 (Fig.2D): basis 3.3 times as long as wide, with a seta at inner distal angle: ischium half the length of basis, with 9-10 shorter setae on inner margin and 5 setae on outer margin; merus 0.8 times as long as ischium, with 19-20 relatively long setae on inner margin and a seta at outer distal angle: carpus 1.2 times longer than merus, with 30-32 long setae on inner margin and a seta at outer distal angle; propodus as long as carpus, with a dozen setae on both margins.

Pereopod 5 (Fig.2E) : basis 2.5 times as long as basis, with a seta at inner distal angle; ischium 0.6 times as long as basis, with 2 setae on sternal margin; merus 0.6 times as long as ischium, with 12-13 setae on outer margin and 2 setae on outer distal angle; carpus 1.4 times longer than merus, with 15-16 setae on inner margin; propodus 1.2 times longer than carpus, with 13-15 setae on inner margin and 11-12 short setae on outer margin.

Pereopod 6 (Fig. 2F): basis 2.8 times as long as wide, with 20-22 setae on distal half of inner margin; ischium 0.6 times as long as basis, with 5-6 setae on sternal margin; merus 0.6 times as long as ischium, with 7-8 setae on inner margin and 1-2 setae at outer distal angle; carpus 1.3 times longer than merus, with 3 longer and 7-8 shorter setae on inner margin ; propodus 1.1 times longer than carpus, with 13-14 setae on inner margin and 10 short setae on outer margin.

Pereopod 7 (Fig.2G): basis 2.9 times as long as wide; ischium 0.8 times as long as basis, with 11-12 setae on sternal margin; merus half length of ischium, with more than 20 setae on inner margin and a seta at outer distal area; carpus 1.4 times longer than merus, with protruded outer margin in male; propodus 1.2 times longer than carpus, with

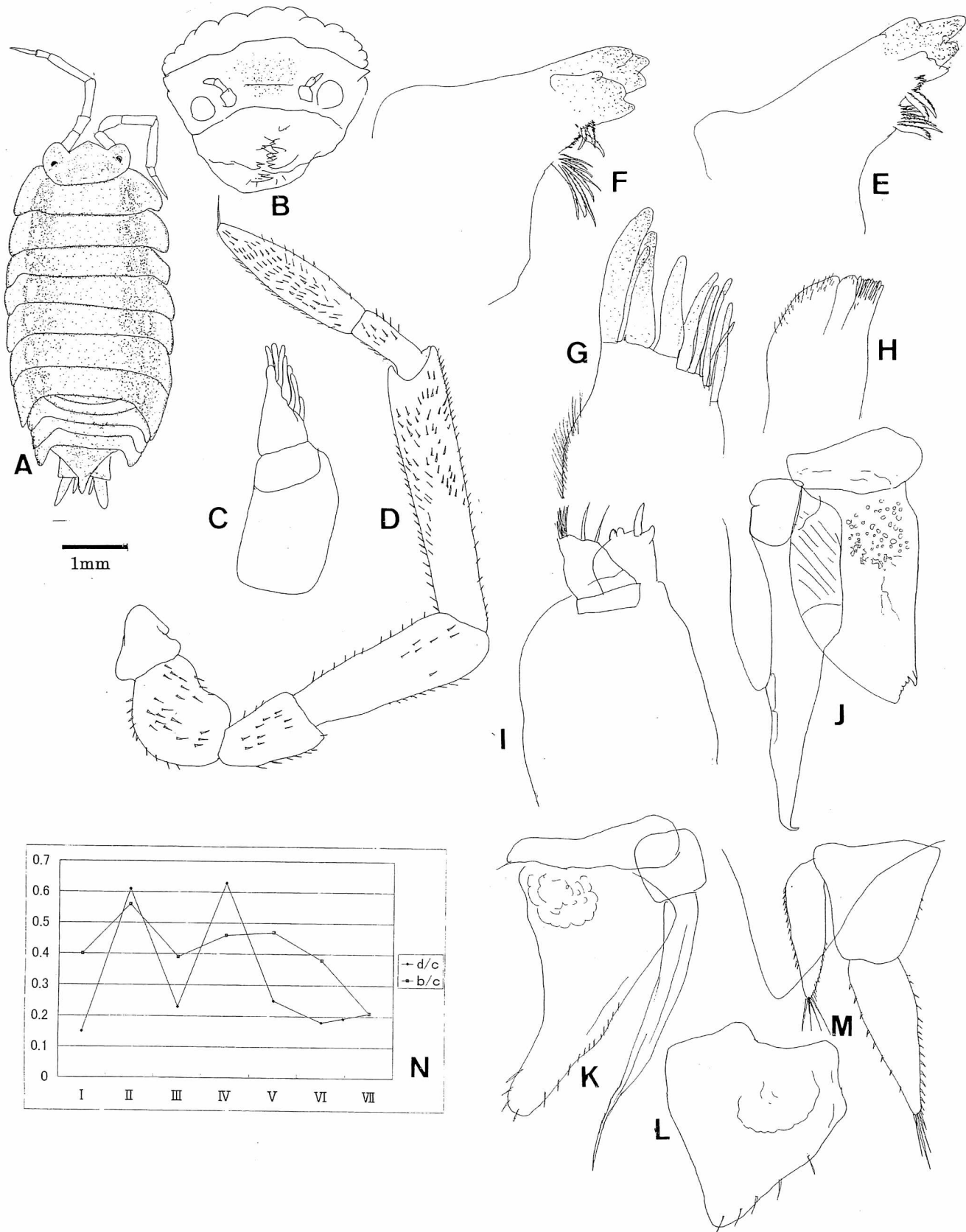


Fig.1 *Lucasioides toyamaensis* n.sp.

A: Dorsal view; B: Anterior view of cephalon; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Outer lobe of maxillula; H: Maxilla; I: Maxilliped; J: Penes and pleopod 1; K: Pleopod 2; L: Pleopod 5; M: Uropod; N: Position of noduli lateralis (All: male holotype).

7-8 setae on inner margin.

Penes (Fig.1J) fusiform.

Pleopod 1 (Fig.1J.): basis short; endopod straight, apical part tapering towards the tip and bending outwards, apical part with 4-5 spinules; exopod with sinuate distal margin.

Pleopod 2 (Fig.1K): basis short; endopod, tapering toward the tip and slightly exceeding exopod; exopod triangular, with a rounded apical area.

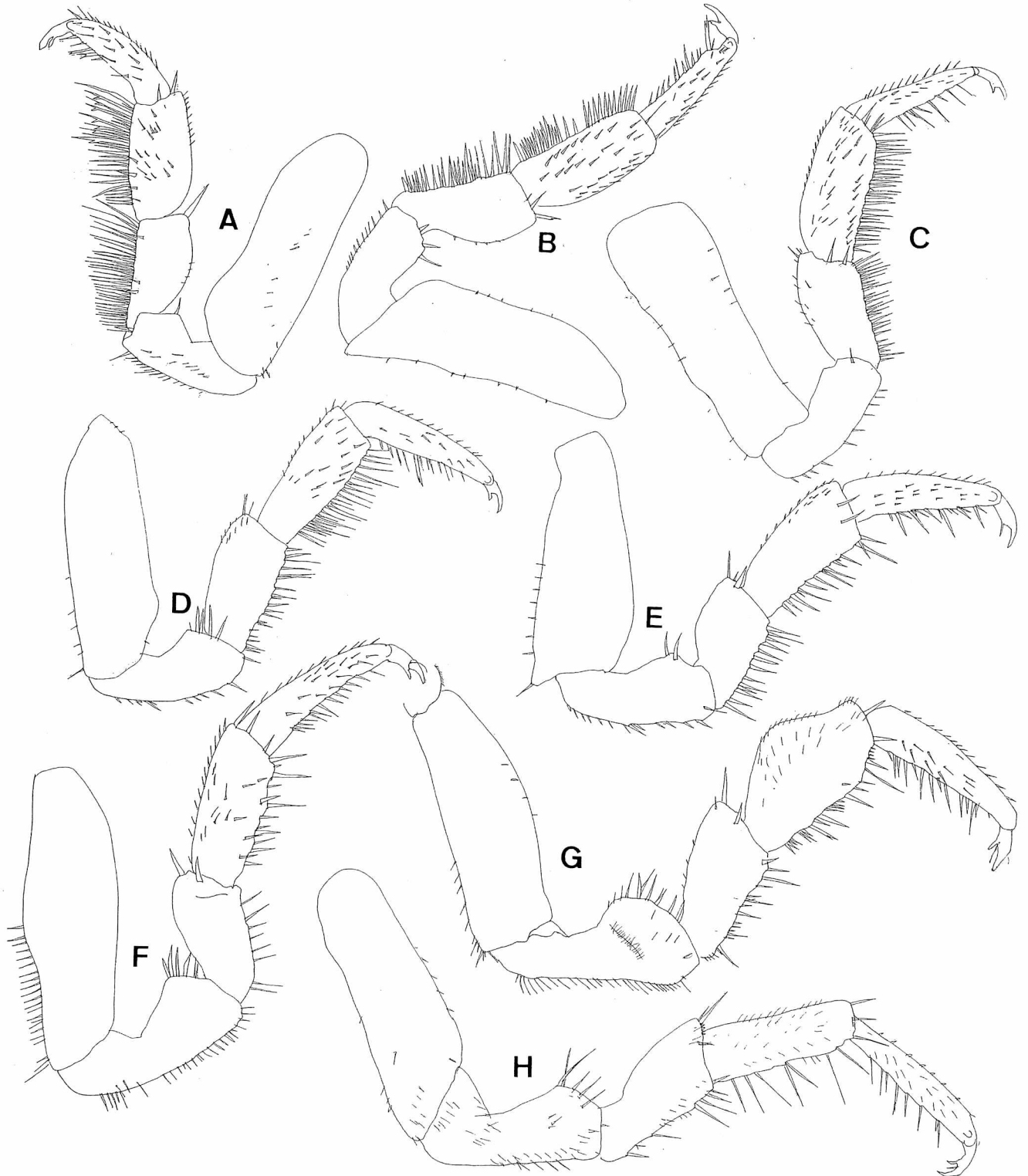


Fig.2 *Lucasioides toyamaensis* n.sp.

A-G: Pereopods 1-7 in male; H: Pereopod 7 in female (A-G: male holotype; H: female allotype).

Pleopod 5 (Fig.1L): exopod triangular, with 5 setae on outer margin.

Uropod (Fig.1M): basis almost square; endopod with a tuft of setae at the tip; exopod narrower and shorter than endopod, with a tuft of setae at the tip.

Female differs from male in absence of protrusion of carpus of pereopod 7 (Fig.3H) and the sexual characters.

Etymology: "Toyama" is a name of prefecture, where the type locality is located.

Remarks: Hitherto, twelve species of the genus *Lucasioides* have been recorded in Japan (Nunomura, 1987, 1991, 1992, 2000, 2007 Schamalfuss, 2003). Of these, the present new species is most closely allied to *Lucasioides kobarii* (Nunomura, 1987). But the former is separated from the latter in the following features; (1) sinuate distal margin of exopod of male first pleopod, (2) acute apical part of pleotelson, (3) position of noduli lateralis on pereonal somite and (4) all the setae on exopod of maxillula and smaller eyes.

Lucasioides sagarai n.sp.

(Japanese name: Mogura-ana-warajimushi, new)

(Figs. 3-5)

Material examined: 4♂♂ (1♂ holotype, 4.6 mm in body length and 3♂♂ paratypes, 4.2-4.6 mm in body length) and 7♀♀ (1♀ allotype, 4.6 mm in body length and 6♀♀ paratypes, 4.0-4.6mm in body length) from the tunnel of lesser Japanese mole, *Mogera imaizumii*, norther slope of Angoji-Park, Yasui, Nanto-shi, Toyama-ken, Nov. 4, 2006, coll. Naohiko Sagar. Type series is deposited as follows: holotype (TOYA Cr-13628), allotype (TOYA Cr-13629) and 3 paratypes (TOYA Cr-13630~13632) at Toyama Science Museum, 3 paratypes (KUZ Z 15~17) at The Kyoto University Museum 3 paratypes (NSMT Cr-17978) at National Museum of nature and science, Tokyo.

Description: Body white, 2.2 times as long as wide. Color paler brown in alcohol. Cephalon (Fig.3B) with low medial process anteriorly but not protruded upwards. Anterolateral lobe rounded. Eyes small, each eye with 16-18 ommatidia. Noduli lateralis on pereonal somites 2-4 located at remote position from lateral margin (Fig.3J).

Antennule (Fig.3C): segment 1 rectangular; segment 2 short, terminal segments with 6 aesthetascs. Antenna (Fig. 3D); flagellum 2-segmented; terminal segment 3.0 times longer than the basal one. Right mandible (Fig.3E): pars incisiva 3-toothed; lacinia mobilis not chitinized and weakly 3-toothed; 2 pencils; processus molaris represented by a tuft of setae. Left mandible (Fig.3F): pars incisiva 3-toothed; lacinia mobilis 3-toothed; 2 pencils; processus molaris represented by a tuft of setae. Maxillula (Fig. 3G): inner lobe with 2 relatively long plumose setae and 2 short setae on distal margin; outer lobe with 10 simple setae on distal margin. Maxilla (Fig.3H) rather lobe. Maxilliped (Fig.3I): endite round, with 2 spurs and 2 setae on distal margin; palp relatively stout, with 2 groups of setae on inner margin and a group of setae at the tip.

Pereopod 1 (Fig.4A): basis 3.4 times as long as wide, with a seta at the inner distal angle; ischium one-third as long as basis, with 4 setae on inner margin; merus a little shorter than ischium, with more than 20 long setae on inner margin; carpus 1.3 times longer and a little stouter than merus, with 23-24 setae on inner margin, the last one trifid; propodus as long as carpus, with 7-8 setae on inner margin.

Pereopod 2 (Fig.4B): basis 3.4 times as long as wide, with 7-8 setae on inner margin and 3 setae on outer margin; ischium 0.3 times as long as basis, with 5-6 short setae on inner margin; merus as long as ischium, with 17-18 setae on inner margin; carpus 1.2 times longer than merus, with more than 32 setae including 4-5 trifid ones on inner margin; propodus a little shorter than carpus, with 10 setae on inner margin.

Pereopod 3 (Fig.4C): basis 3.2 times as long as wide, with 3 setae on inner margin; ischium 0.55 times as long as wide, with 10 setae on inner margin and 2 setae at outer distal angle; merus a little shorter than ischium, with 15-16 setae on inner margin; carpus 1.2 times longer than merus, with many setae on inner margin; propodus as long as carpus, with 7 setae both margins.

Pereopod 4 (Fig.4D): basis 3.5 times as long as wide; ischium half the length of basis, with 3-4 setae on both margins; merus 2/3 as long as ischium, with 2-3 setae on inner margin; carpus 1.6 times longer than merus, with 4-5 setae on inner margin; propodus somewhat shorter than carpus, with 4 long setae on inner margin.

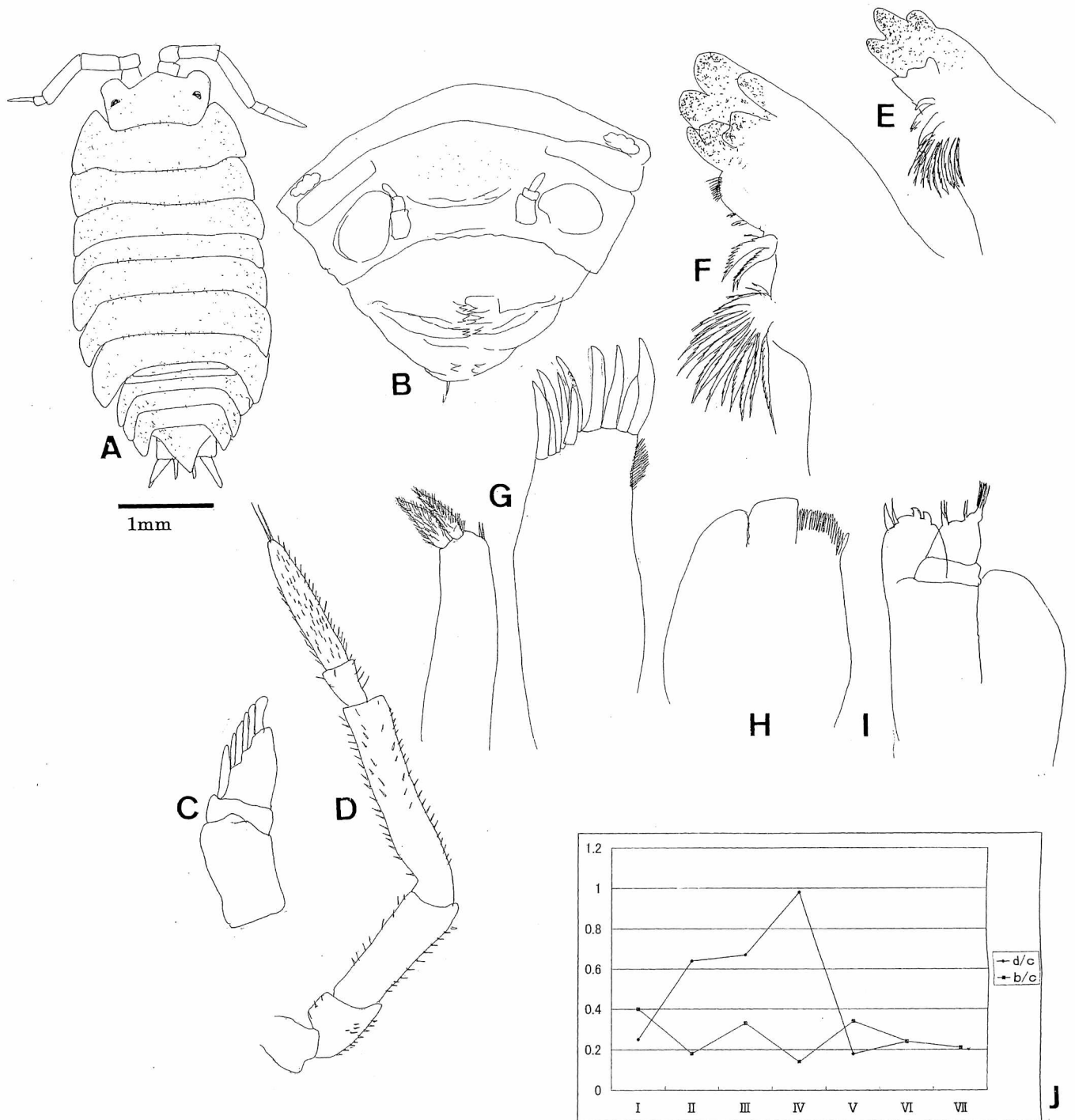


Fig.3 *Lucasioides sagarai* n.sp.

A: Dorsal view; B: Anterior view of cephalon; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J: Position of noduli lateralis (All: male holotype).

Pereopod 5 (Fig.4E) a little longer than pereopod 4: basis 2.9 times as long as wide, with 5-6 setae on both margins; ischium half the length of basis; merus a little shorter than ischium, with 6-7 setae on inner margin; carpus 1.4 times longer than merus, with 9-12 setae on inner margin; propodus 1.2 times longer than carpus, with 6 setae on inner margin.

Pereopod 6 (Fig.4F) a little longer than pereopod 5: basis 2.6 times as long as wide, with 7-8 setae on inner margin and 6 setae at outer distal angle; ischium 0.6 times as long as basis, with 12-13 setae on inner margin and 3 setae on sternal margin; merus 0.7 times as long as ischium, with 8-9 setae on inner margin and 4-5 setae on distal margin;

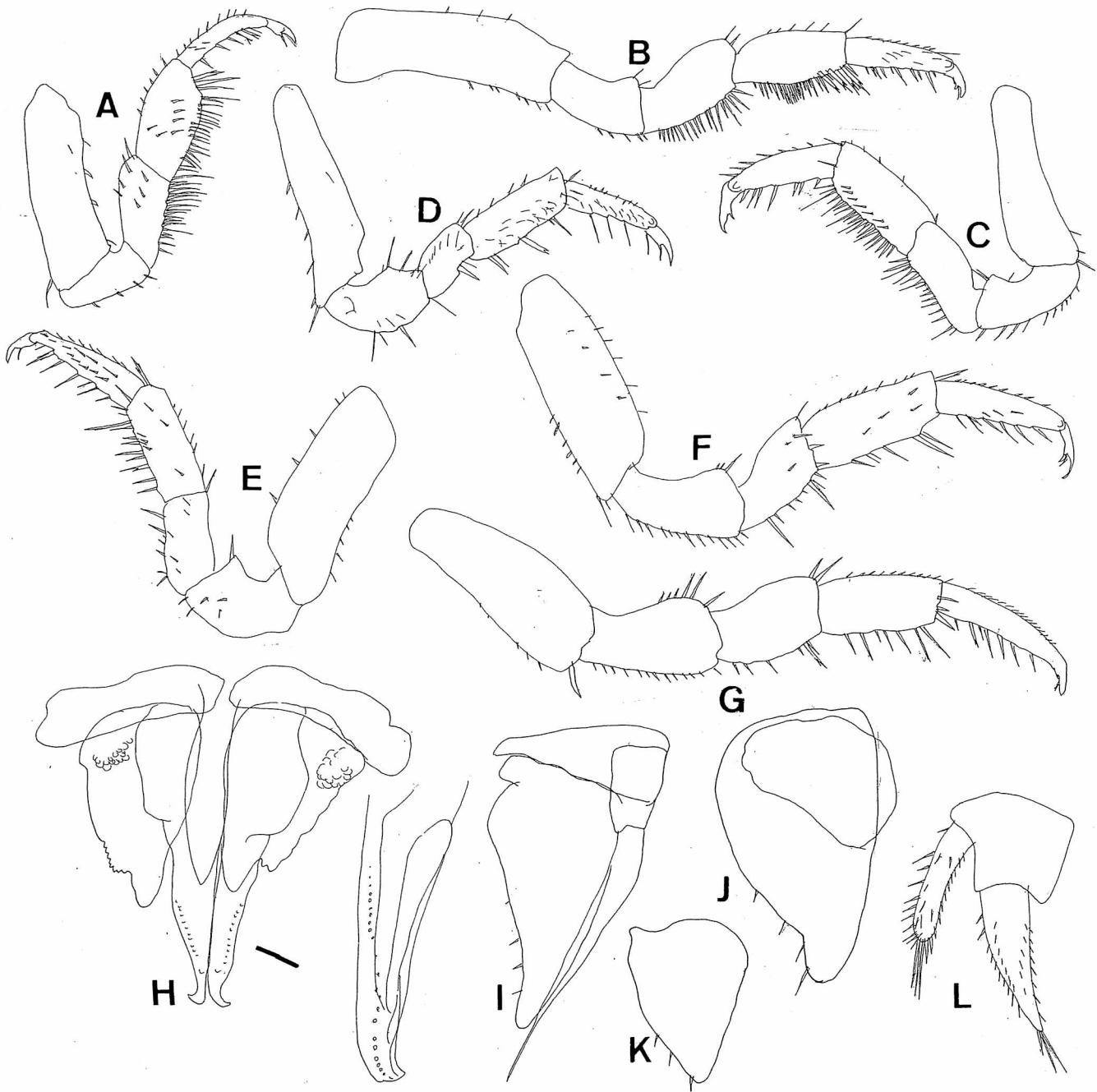


Fig.4 *Lucasioides sagarai* n.sp.

A-G: Pereopods 1-7; H: Penes and pleopod 1; I: Pleopod 2; J-K: Pleopods 4-5; L: Uropod (All: male holotype).

carpus 1.8 times longer than merus, with 6 setae on inner margin and a relatively long seta at outer distal angle; propodus a little shorter than carpus, with 7 setae on inner margin and 8-9 short setae on outer margin.

Pereopod 7 (Fig. 4G) a little longer than pereopod 6: basis 2.5 times as long as wide, with 5-6 short setae on inner margin and a seta at inner distal area; ischium 0.7 times as long as basis, with 12 setae on inner margin and 6 setae on distal half of outer margin ; merus 0.8 times as long as ischium, with 5-6 setae on inner margin and 2 setae at outer distal area ; carpus 1.3 times longer than merus, with 7-8 setae on inner margin and 11-12 short setae on outer margin; propodus a little longer than carpus, with 8-9 setae including a bifid seta on inner margin and more than 18 short setae on outer margin.

Penes (Fig.4H): slender and fusiform.



Fig.5 The aspect of northern slope of Angoji-park, Yasui, Nanto-shi, where *Lucasioides sagarai* was collected.
The photo was taken by Dr. Y. Yokohata on 4 Nov. 2006.

Pleopod 1 (Fig.4H): basis low rectangular; endopod relatively stout, with a curved apical area bearing 25-28 denticles along the margin; exopod round triangular, with an outer margin bearing sinuate mid-distal area and a concavity.

Pleopod 2 (Fig.4I): basis low light angled triangular; endopod tapering toward the tip, exceeding exopod; exopod triangular, with not-concave outer margin bearing 3 setae.

Pleopod 3: exopod triangular, with 4-5 setae on outer margin.

Pleopod 4 (Fig.4J): endopod triangular, with 4 setae on outer margin; exopod round.

Pleopod 5 (Fig.4K): exopod roundly triangular, with setae on outer margin.

Uropod (Fig.4L); basis almost square; endopod rectangular and apical area rounded ; exopod 1.3 times as long as endopod and triangular, with 3-4 setae at the tip.

Female differs from male in the sexual characters.

Etymology: The species name is dedicated to Dr. Naohiko Sagara, collector of the present species.

Remarks: The present new species is most closely allied to *L. minatoi* (Nunomura) recored from Kii Pennsula. But the former is separated from the latter in the following features; (1) sinuate distal margin of exopod of male first pleopod, (2) remote position of noduli lateralis on personal somite, (3) curved apical area of male first pleopod, (4) longer endopod of male second pleopod and (5) smaller eyes.

The present new species is also separated from *Lucasioides toyamaensis*, already described in this paper, in the following features; (1) less protruded carpus of male seventh pereopod, (2) position of noduli lateralis, (3) shape of exopod of male (4) paler body color, (5) longer of endopod of male first pleopod and (6) anterior margin of frontal margin.

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